REMARKS

Applicant has corrected the drawings, abstract, and specification to correct minor typographical and grammatical errors; to provide the patent number of the granted application at page 3, to delete reference to FIG. 10 at page 4; to encompass the various embodiments at page 5; to provide a more accurate description of the drawing at page 8; to provide a description to support the subject matter of original claim 13 at page 9; to correct inconsistent reference numerals at pages12-15; and to delete reference numerals from FIGS. 3A and 3B, as indicated in red on the attached copies of the originally filed drawings, that are not supported in the specification. Applicant submits that no new matter has been added by these corrections.

In the Office Action, the disclosure stands objected for two informalities. Applicant has corrected the specification by deleting the word "raw" at page 6, line 14 of the specification and correcting the typographical misspelling of "inventino" at page 6, line 33. Accordingly, the objection to the specification should be withdrawn in the next Office action.

Claims 1-18 are pending in the application. By this Amendment, Applicant has amended claims 1, 3, 4, 6, and 7; and added new claims 19-36. Claims 2, 5, and 8-18 remain in the application without amendment.

Claim 7 stands objected to because of an informality. Applicant appreciates the Examiner's suggestion for correcting the informality in the claim. Per the Examiner's suggestions, Applicant has deleted the second occurrence of the phrase "to have" at line 5. Accordingly, the objection to claim 7 should be withdrawn in the next Office action.

Claim 1 stands rejected under 35 USC 112, second paragraph, as being indefinite for an alleged insufficient antecedent basis for "a first base station." Claim 1 as amended does not recite "a first base station." Applicant submits that claim 1 as amended meets the requirements of 35 USC 112, second paragraph, therefore the rejection of claim 1 pursuant this section should be withdrawn in the next Office action.

Claims 1, 3, 4, 6, and 7 have also been amended, for reasons other than related to patentability. For example, reference to "step" has been deleted in claims 1, 3, 4, 6, and 7 so as to avoid construction as a means-plus-function element; indefinite articles "a," "an," "the," and "said" have been inserted in claims 1, 3, 4, 6, and 7 for grammatical correctness; the word "of" in claims 3 and 7 have been deleted where its use is meaningless; --in accordance with-- has been substituted for "when" in claim 1 to broaden the limitation; the redundant phrase "of signals transmitted by said first base station" has been deleted from claim 1; --signal indicative of-- has been substituted for "spreading code selected in accordance with" in claim 6 to broaden the limitation; --determined-- has been substituted for "selected" in claim 7 to maintain consistent terminology within the claim.

Claims 1-4, 7-9, and 12 stand rejected under 35 USC 102(b) as being anticipated by Park (USPN 6,154,652). Applicant respectfully traverses this rejection.

To anticipate a claim, the reference must teach every aspect of the claimed invention either explicitly or impliedly. (MPEP 706.02.) Independent claim 1 recites, among other things, "receiving an indication of a link quality of signals transmitted by said first station; and selectively performing said handoff in accordance with said indication of the link quality". Applicant submits that the cited reference does not teach the combination defined by the claim.

In contrast, Park describes base stations that send "signals," and a terminal that measures the strength of the "signals." Nowhere does Park describe "an indication of a link quality of signals transmitted by said first station" or "selectively performing said handoff in accordance with said indication of the link quality." Thus, independent claim 1, and claims 2-4, 7-9, and 12 at least by virtue of their dependency on claim 1, are patentably distinguishable over the cited reference. Accordingly, the rejection of the claims under 35 USC 102(b) should be withdrawn in the next Office action.

Moreover, upon careful reading of the extensive citations to Parks extending over multiple columns, Applicant is unable to find teachings for the limitations of dependent claims 2, 3, 7-9, and 12. Applicant respectfully requests of the Examiner to provide more focused citations for the teachings of "power control commands" recited in

claims 2, 8, 9, and 12; "determining in accordance with said indication of link quality whether signals transmitted by said subscriber station are being received by said selected base station with sufficient energy" recited in claim 3; and "determining in accordance with said indication of link quality whether signals transmitted by said subscriber station are being received by said determined base station with sufficient energy" and "performing said handoff to an alternative base station when signals transmitted by said subscriber station are not being received by said determined base station with sufficient energy" as recited in claim 7.

For these additional reasons, the rejection of claims 2, 3, 7-9, and 12 under 35 USC 102(b) should be withdrawn in the next Office action.

Claims 5, 6, 10, 11, and 13-18 stand rejected under 35 USC 103(a) as being unpatentable over Parks in view of I (USPN 6,088,335). Applicant respectfully traverses this rejection.

At least by virtue of claims 5, 6, 10, 11, and 13-18 dependency on patentable claims 1, 3, and 7-9, as argued above in traversing the rejection under 35 USC 102(a), the rejection of claims 5, 6, 10, 11, and 13-18 under 35 USC 103(a) should be withdrawn in the next Office action.

Moreover, Applicant is unable to find teachings for the limitations of dependent claims 6, 10, and 11 in citations to Parks or I. For example, neither Parks or I provides teachings for "spreading a message indicative of a requested rate by a signal indicative of said selected base station" recited in claim 6; and "power control commands" recited in claims 10 and 11.

For these additional reasons, the rejection of claims 6, 10, and 11, and claims 16 and 17 at least by virtue of their dependency on patentable claims 6 and 10, under 35 USC 103(a) should be withdrawn in the next Office action.

Finally, to properly combine teachings of different references, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art at the time of the invention, to

combine the teachings to obtain the claimed subject matter. (MPEP 706.02(j).) Applicant submits that the suggestion or motivation for combining is not contained in any of the cited references or in the knowledge generally available to one of ordinary skill in the art at the time of the invention. Rather, the Examiner is engaging in speculation and assumption as to a possible suggestion or motivation to combine the teachings when citing "more convenient controlling access" and "further improve efficient power control" when combining the teachings of I with the teaching of Parks. Thus, a prima facie case of obviousness is not established for the claim. Accordingly, for this additional reason, the rejection of claims 5, 6, 10, 11, and 13-18 under 35 USC103(a) should be withdrawn in the next Office action.

Applicant has added new claims 19-36, which Applicant submits define an invention that is not anticipated by, and is nonobvious over, Parks and I, taken singularly or in combination. Applicant submits that no new matter is added by the addition of the new claims.

REQUEST FOR ALLOWANCE

In view of the foregoing, Applicants submit that all pending claims in the application are patentable. Accordingly, reconsideration and allowance of this application is earnestly solicited. Should any issues remain unresolved, the Examiner is encouraged to telephone the undersigned at the number provided below.

Respectfully submitted,

Dated: 05/13/2002

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APPENDIX A

A communication system including a closed loop power control system. Prior to allowing a handoff to a new base station, the subscriber station verifies that its reverse link signal is being received by the destination base station with sufficient energy. The determination is made based on the received reverse link power control commands from the base station. Moreover, a handoff may be forced when the base station providing the best forward link signal [in] <u>is</u> not receiving the reverse link signal from the subscriber station with sufficient energy.

APPENDIX B

Page 2, line 33, fourth full paragraph:

A significant difference between voice services and data services is the fact that the former imposes stringent and fixed delay requirements. Typically, the overall one-way delay of speech frames must be less than 100 msec. In contrast, the data delay can become a variable parameter used to optimize the efficiency of the data communication system. Specifically, more efficient error correcting coding techniques which require significantly larger delays than those that can be tolerated by voice services can be utilized. An exemplary efficient coding scheme for data is disclosed in U.S. Patent [Application Serial] No. [08/743,688] 5,933,426, entitled "SOFT DECISION OUTPUT DECODER FOR DECODING CONVOLUTIONALLY ENCODED CODEWORDS", filed November 6, 1996, issued August 3, 1999, assigned to the assignee of the present invention and incorporated by reference herein.

Page 4, line 7, first full paragraph:

The C/I achieved by any given user is a function of the path loss, which for terrestrial cellular systems increases as r^3 to r^5, where r is the distance to the radiating source. Furthermore, the path loss is subject to random variations due to man-made or natural obstructions within the path of the radio wave. These random variations are typically modeled as a log normal shadowing random process with a standard deviation of 8 dB. [The resulting C/I distribution achieved for an ideal hexagonal cellular layout with omni-directional base station antennas, r^4 propagation law, and shadowing process with 8 dB standard deviation is shown in Fig. 10.]

Page 4, line 16, second full paragraph:

The obtained C/I distribution can only be achieved if, at any instant in time and at any location, the subscriber station is served by the best base station which is defined as that achieving the largest C/I value, regardless of the physical distance to each base station. Because of the random nature of the path loss as described above, the signal with the largest C/I is not always transmitted by the base station closest to the

subscriber station. In contrast, if a subscriber station was to communicate only via the base station of minimum distance, the C/I can be substantially degraded. It is therefore beneficial for subscriber stations to communicate to and from the best serving base station at all times, thereby achieving the optimum C/I value. It can also be observed that the range of values of the achieved C/I, in the above idealized model [and as shown in FIG. 10], is such that the difference between the highest and lowest value can be as large as 10,000. In practical implementation the range is typically limited to approximately 1:100 or 20 dB. It is therefore possible for a CDMA base station to serve subscriber stations with information bit rates that can vary by as much as a factor of 100, since the following relationship holds:

$$R_b = W\frac{(C/I)}{(E_b/I_o)}, \qquad (2)$$

where R_b represents the information rate to a particular subscriber station, W is the total bandwidth occupied by the spread spectrum signal, and E_b/I_o is the energy per bit over interference density required to achieve a given level of performance. For instance, if the spread spectrum signal occupies a bandwidth W of 1.2288 MHz and reliable communication requires an average E_b/I_o equal to 3 dB, then a subscriber station which achieves a C/I value of 3 dB to the best base station can communicate at a data rate as high as 1.2288 Mbps. On the other hand, if a subscriber station is subject to substantial interference from adjacent base stations and can only achieve a C/I of -7 dB, reliable communication can not be supported at a rate greater than 122.88 Kbps. A communication system designed to optimize the average throughput will therefore attempts to serve each remote user from the best serving base station and at the highest data rate R_b which the remote user can reliably support. The data communication system of the present invention exploits the characteristic cited above and optimizes the data throughput from the CDMA base stations to the subscriber stations.

Page 5, line 17, first full paragraph:

The present invention [is a novel and improved] resides in a communication system, apparatus, and method for performing handoff in a wireless communication system, which takes into account the ability of a base station to receive the reverse link transmissions from the subscriber station.

Page 6, line 14, second full paragraph:

In an alternative embodiment, the subscriber station stores the [raw] power control commands from each base station. In a second alternative embodiment, the subscriber station stores an indication of the number of consecutive or nearly consecutive requests to increase transmission energy from each base station. A series of requests to increase transmission energy indicates that the base station is not receiving the reverse link signal.

Page 6, line 30, fifth full paragraph:

If the selected base station does require a handoff, then the subscriber uses the method of the present [inventino] invention to determine if the selected base station is receiving its reverse link transmissions. In the exemplary embodiment, the subscriber station makes this determination by looking at the history of reverse link power control commands transmitted by the selected base station. A sufficient number of power control commands by a given base station requesting the subscriber station to decrease its transmission energy indicates that the reverse link signal is being received by the base station with sufficient energy. It will be understood that other methods of performing this analysis are equally applicable, for example the base stations could intermittently [transmits] transmit a message indicating the average quality of the received reverse link signal.

Page 7, line 37, fifth full paragraph:

The features, objects, and advantages of the present invention will become more apparent from the detailed description set forth below when taken in conjunction with

the drawings in which like reference characters identify correspondingly throughout and wherein:

FIG. 1 is a flowchart illustrating [the] an exemplary method of [the] performing a handoff;

FIG. 2 is a basic diagram illustrating [the handoff condition of the present invention] an exemplary embodiment of a communication system;

FIGS. 3A and 3B [are] is a block [diagrams of the] diagram illustrating an exemplary embodiment of [the] a base station [of the present invention];

[FIG. 4 is a diagram of the] FIGS. 4A and 4B are diagrams illustrating an exemplary embodiment of a frame structure and slot structure [of the present invention]; and

FIG. 5 is a block diagram [of the] illustrating an exemplary embodiment of a subscriber station [of the present invention].

Page 9, line 18, third full paragraph:

If the selected base station does require a handoff, then the process moves to block 108. In block, 108, the subscriber determines if the selected base station is receiving its reverse link transmissions. In the exemplary embodiment, the subscriber station makes this determination by looking at the history of reverse link power control commands transmitted by the selected base station. A sufficient number of power control commands requesting the subscriber station to decrease its transmission energy is indicative that the signal strength of its reverse link transmissions are being received by the selected base station. It will be understood that other methods of performing this analysis are equally applicable, for example the base stations could intermittently [transmits] transmit a message indicating the average quality of the received reverse link signal. Furthermore, the busy tones, as described below, can be used to determine the quality of the reverse link.

Page 10, line 28, fourth full paragraph:

Referring to the figures, FIG. 2 represents [the] an exemplary embodiment of a data communication system [of the present invention which comprises] comprising

multiple cells 200a-200f. Each cell 200 is serviced by a corresponding base station 202 or base station 204. Base stations 202 are base stations that are in active communication with subscriber station 206 and are said to make up the active set of subscriber station 206. Base stations 204 are not in communication with subscriber station 206 but have signals with sufficient strength to be monitored by subscriber station 206 for addition to the active set if the strength of the received signals increases due to a change in the propagation path characteristics. Base stations 204 are said to make up the candidate set of subscriber station 206.

Page 11, line 14, first full paragraph:

A block diagram of [the] <u>an</u> exemplary [forward link architecture of the present invention] <u>embodiment of a base station</u> is shown in [FIG. 3A] <u>FIGS. 3A and 3B</u>. The data is partitioned into data packets and provided to CRC encoder 312. For each data packet, CRC encoder 312 generates frame check bits (e.g., the CRC parity bits) and inserts the code tail bits. The formatted packet from CRC encoder 312 comprises the data, the frame check and code tail bits, and other overhead bits which are described below. The formatted packet is provided to encoder 314 which, in the exemplary embodiment, encodes the data in accordance with a convolutional or turbo encoding format. The encoded packet from encoder 314 is provided to interleaver 316 which reorders the code symbols in the packet. The interleaved packet is provided to frame puncture element 318 which removes a fraction of the packet in the manner described below. The punctured packet is provided to multiplier 320 which scrambles the data with the scrambling sequence from scrambler 322. The output from multiplier 320 comprises the scrambled packet. The scrambled packet is provided to variable rate controller 330 which demultiplexes the packet into K parallel in-phase and quadrature-phase channels, where K is dependent on the data rate. In the exemplary embodiment, the scrambled packet is first demultiplexed into the in-phase (I) and quadrature-phase (Q) streams. In the exemplary embodiment, the I stream comprises even indexed symbols and the Q stream comprises odd indexed symbol.

Page 12, line 13, second full paragraph:

In addition, a forward activity bit is provided to symbol repeater 350. The forward activity bit alerts subscriber station [106] 206 to a forthcoming blank frame in which the base station will not transmit forward link data. This transmission is made in order to allow subscriber station [106] 206 to make a better estimate of the C/I of the signal from base stations [102] 202. The repeated versions of the forward activity bit are Walsh covered in Walsh cover element 352 so as to be orthogonal to the Walsh covered power control bits. The covered bits are provided to gain element 354 which scales the bits prior to modulation so as to maintain a constant total transmit power.

Page 12, line 22, third full paragraph:

In addition, a busy tone is provided to symbol repeater 350. The busy tone alerts subscriber station [106] 206 to a reverse link loading condition. In an exemplary embodiment, the busy tone is a single bit indicative of the reverse link being fully loaded or having capacity. In the preferred embodiment, the busy tone is a two bit signal indicative of a request by base stations [102] 202 for subscriber stations [106] 206 in its coverage area to either deterministically increase or decrease the rate of their reverse link transmissions, or to stochastically increase or decrease the rate of their reverse link transmissions. The repeated versions of the busy tone is Walsh covered in Walsh cover element 352 so as to be orthogonal to the Walsh covered power control bits and forward activity bit. The covered bit is provided to gain element 354 which scales the bits prior to modulation so as to maintain a constant total transmit power.

Page 12, line 34, fourth full paragraph:

The pilot data comprises a sequence of all zeros (or all ones) which is provided to multiplier 356. Multiplier 356 covers the pilot data with Walsh code W0. Since Walsh code W0 is a sequence of all zeros, the output of multiplier 356 is the pilot data. The pilot data is time multiplexed by MUX 362 and provided to the I Walsh channel which is spread by the short PNI code within complex multiplier 366 (see FIG. 3B). In the exemplary embodiment, the pilot data is not spread with the long PN code, which is

gated off during the pilot burst by MUX 376, to allow reception by all subscriber stations [376] 206. The pilot signal is thus an unmodulated BPSK signal.

Page 13, line 24, second full paragraph:

In the exemplary embodiment, the data packet is spread with the long PN code and the short PN codes. The long PN code scrambles the packet such that only the subscriber station [106] 206 for which the packet is destined is able to descramble the packet. In the exemplary embodiment, the pilot and power control bits and the control channel packet are spread with the short PN codes but not the long PN code to allow all subscriber stations [106] 206 to receive these bits. The long PN sequence is generated by long code generator 374 and provided to multiplexer (MUX) 376. The long PN mask determines the offset of the long PN sequence and is uniquely assigned to the destination subscriber station [106] 206. The output from MUX 376 is the long PN sequence during the data portion of the transmission and zero otherwise (e.g. during the pilot and power control portion). The gated long PN sequence from MUX 376 and the short PNI and PNQ sequences from short code generator 380 are provided to multipliers 378a and 378b, respectively, which multiply the two sets of sequences to form the PN_I and PN_Q signals, respectively. The PN_I and PN_Q signals are provided to complex multiplier 366.

Page 14, line 4, first full paragraph:

The block diagram of the exemplary embodiment of the [traffic channel] base station shown in FIGS. 3A and 3B is one of numerous architectures which support data encoding and modulation on the forward link. Other architectures, such as the architecture for the forward link traffic channel in the CDMA system which conforms to the IS-95 standard, can also be utilized and are within the scope of the present invention.

Page 14, line 13, second full paragraph:

A diagram of [the] an exemplary embodiment of a forward link frame structure [of the present invention] is illustrated in FIG. 4A. The traffic channel transmission is

partitioned into frames which, in the exemplary embodiment, are defined as the length of the short PN sequences or 26.67 msec. Each frame can carry control channel information addressed to all subscriber stations [106] 206 (control channel frame), traffic data addressed to a particular subscriber station [106] 206 traffic frame), or can be empty (idle frame). The content of each frame is determined by the scheduling performed by the transmitting base station [102] 202. In the exemplary embodiment, each frame comprises 16 time slots, with each time slot having a duration of 1.667 msec. A time slot of 1.667 msec is adequate to enable subscriber station [106] 206 to perform the C/I measurement of the forward link signal. A time slot of 1.667 msec also represents a sufficient amount of time for efficient packet data transmission.

Page 14, line 30, fourth full paragraph:

An exemplary diagram of the forward link slot structure [of the present invention] is shown in FIG. 4B. In the exemplary embodiment, each slot comprises three of the four time multiplexed channels, the traffic channel, the control channel, the pilot channel, and the overhead control channel. In the exemplary embodiment, the pilot signal is transmitted in two bursts and the overhead control channel is transmitted on either side of the second pilot burst. The traffic data is carried in three portions of the slot (402a, 402b and 402c).

Page 15, line 6, first full paragraph:

FIG. 5 illustrates an exemplary embodiment of the subscriber station [106] 206 [of the present invention]. Forward link signals are received at antenna 500 and provided through duplexer 502 to receiver 504. In the exemplary embodiment, receiver 504 is a quaternary phase shift keying (QPSK) receiver. It will be understood by one skilled in the art that the present invention is equally applicable to any other modulation format such as BPSK or QAM.

Page 15, line 12, second full paragraph:

The in-phase and quadrature-phase components of the received signal are provided to PN despreaders 506. In the exemplary embodiment, multiple PN despreaders 506A-506N are provided. Each of despreaders 506 is capable of demodulating a signal from a different base station in the Active set of subscriber station [106] 206 or a different multipath component of the signal from a base station.

Page 15, line 18, third full paragraph:

The PN despread signal is provided to power control command (PCC) demodulator 508. In the exemplary embodiment, PCC demodulator 508 performs an FHT on the received power control symbols and determines whether the base station is requesting subscriber station [106] 206 to increase or decrease its transmission energy.

Page 15, line 23, fourth full paragraph:

The demodulated power control symbols are provided to power control command combiner 516. In the exemplary embodiment, power control command combiner 516 soft combines multipath components of the power control command symbols from a single base station and generates a hard estimate of the power control command from each base station. The hard [decision] estimate from each of the base stations is stored in memory 518. In an alternative embodiment, a statistic representing the recent history of power control commands from each base station is stored in memory 518.

Page 15, line 31, fifth full paragraph:

Then, power control command combiner 516 performs an OR-of-the-downs operation in which the transmission energy of subscriber station [106] 206 is only increased if all the power control commands indicate a need to increase the transmission energy. Power control command combiner 516 provides a control signal to transmitter (TMTR) 528 increasing or decreasing its amplification of the reverse link signal from subscriber station [106] 206.

Page 16, line 7, first full paragraph:

Control Processor 520 sums the energies from multipath components of a common base station and generates and chip energy to interference ratio for each base station. Control processor 520 then selects the base station with the highest (C/I) and selects a requested rate for that base station. After the base station is selected, the operation described in blocks 106-118 of FIG. 1 is performed by control processor 520.

Page 16, line 23, third full paragraph:

Transmitter 528 upconverts, amplifies, and filters the signal for transmission. In the exemplary embodiment, transmitter 528 also spreads the reverse link signal in accordance with a pseudonoise sequence. The signal is provided through duplexer 502 for transmission through antenna 500.

APPENDIX C

1. (Once Amended) In a wireless communication system, a method for performing handoff comprising [the steps of]:

at a first station, determining when a handoff is necessary;

receiving [a] an indication of a link quality of signals transmitted by said first station; and

selectively performing said handoff [when] in accordance with said indication of the link quality [of signals transmitted by said first base station].

3. (Once Amended) The method Claim 1 wherein said first station is a subscriber station and [said step of] selectively performing said handoff comprises [the steps of]:

selecting a base station to transmit to said subscriber station;

determining in accordance with said indication of the link quality whether signals transmitted by said subscriber station are [of] being received by said selected base station with sufficient energy; and

performing said handoff to said selected base station when [said step of determining indicates that] signals transmitted by said subscriber station are [of] being received by said selected base station with sufficient energy.

4. (Once Amended) The method of Claim 3 wherein [said step of] performing said handoff comprises transmitting a message indicating the identity of said selected base station.

6. (Once Amended) The method of Claim 4 wherein [said step of] transmitting said message comprises spreading a message indicative of [said] a requested rate by a [spreading code selected in accordance with] signal indicative of said selected base station.

7. (Once Amended) The method Claim 1 wherein said first station is a subscriber station [and said step of] selectively performing said handoff comprises [the steps of]:

determining that a base station used to communicate with said subscriber station continues to have [to have] the strongest signal received by said subscriber station;

determining in accordance with said indication of <u>the</u> link quality whether signals transmitted by said subscriber station are [of] being received by said [selected] <u>determined</u> base station with sufficient energy; and

[forcing a] <u>performing said</u> handoff to an alternative base station when [said step of determining indicates that] signals transmitted by said subscriber station are not being received by said [selected] <u>determined</u> base station with sufficient energy.